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<u>C l a i m s</u>

1.   Sensor assembly for determining the condition of a structure, especially
for confirming if a measured fingerprint is on a live finger, by measuring characteristics
of close to the structure surface, the sensor comprising

5   a current source

             at least four electrodes at chosen positions relative to each other, said
positions providing at least two relative distances between the electrodes, wherein a
chosen first pair of said at least four electrodes constitutes current supply electrodes,
and a chosen second pair of said at least four electrodes, of which at least one does not

10   constitute a current supply electrode, constitutes pickup electrodes,

             a measuring instrument coupled to said at least four electrodes for
measuring the impedance between said chosen pair of pickup electrodes for providing a
value characterizing the structure,

             storage means for storing a predetermined set of values characterising a

15   chosen condition for said structure, and

             the sensor also comprising calculation means for comparing said
characteristics from each of said at least one pair of pickup electrodes with said set of
predetermined values for detecting if said structure is in a certain condition, and the
sensor assembly is adapted to alternating coupling of at least one current supply and

20   measuring instrument to different electrode pairs with different distances between them,
for measuring characteristic values at different depths in said structure.

2.   Sensor assembly according to claim 1, wherein the supplied current is
oscillating within a chosen frequency range.

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3.   Sensor assembly according to claim 2, comprising measuring means for
measuring the impedance at each pickup electrode, and wherein said calculation means
comprises comparing means for comparing the imaginary and real parts of the
impedance signals as functions of the applied frequency, by determining the slope of the

30   resulting curve, and comparing this slope with a predetermined set of slopes indicating a
live finger.

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4.   Sensor assembly according to claim 1, wherein the distance a first of said supply electrodes and sad first pickup electrode is less than 1mm.

5.   Sensor assembly according to claim 1, comprising control means for interchanging the roles of the electrodes such that the roles of the pickup and supply electrodes may change sequentially for varying the relative positions between the sensors and thus the measured characteristics of the surface.

6.   Sensor assembly according to claim 5,, comprising measuring means for measuring the phase of the signal at each pickup electrode, and wherein said calculation means comprises comparing means for comparing the distance between the pick up and supply electrode at chosen frequencies with the corresponding phase of the signal, and comparing these parameters with a predetermined set indicating a live finger.

7.   Sensor assembly according to claim 1, wherein the pickup electrodes are constituted by sensor elements in a fingerprint sensor array.

8.   Method for characterizing the condition of a structure close to its surface, e.g the electrical characteristics of two outer parts of the skin, i.e. the stratum corneum and the viable skin, by using at least four electrodes coupled to the surface and with at least two different distances between the electrodes, comprising the following steps:
-    applying a current or voltage to the skin between at a first pair of current supply electrodes,
-    measuring the impedance between a second pair of pickup electrodes, of which at least one is not a current supply electrode, and calculating electrical characteristics related to this,
-    sequentially changing the roles of the electrodes, thus to apply a current between a second pair of current supply electrodes and thus to perform measurements with at least two different distances between pickup electrodes and/or current supply electrodes, respectively,
-    comparing the measured impendances with a predetermined set of values characterising at least one condition of the structure,

- determining the condition of the structure based on the comparisons between the measured values and the predetermined set of values.

9. Method according to claim 8, wherein the step of applying a current or voltage between the two electrodes comprises the application of a varying frequency signal and measuring the impedance between one of said current supply electrodes and at least two pickup electrodes positioned at chosen distances from said current supply electrode.

10. Method according to claim 9, wherein the comparison of the measured impedances by determining the slope of the curve describing the relationship between the imaginary and real parts of the measured impedance signal as a function of applied frequency, and comparing the determined slope with a predetermined set of values characterizing a live finger.